Montana Comprehensive Assessment System (MontCAS, Phase 2)

Criterion-Referenced Test (CRT)

COMMON CONSTRUCTED-RESPONSE ITEM RELEASE
MATHEMATICS, GRADE 10

2009

OPI

OFFICE OF PUBLIC INSTRUCTION

For information, contact Measured Progress, P.O. Box 1217, Dover, NH 03821-1217.
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Mathematics
Session 1 (No Calculator)

You may NOT use a calculator during this session.

Write your answer in the space provided for it in your Student Response Booklet. Show all of your work.

23. Trash Gone garbage removal service provides a free garbage can and charges $20 a month to empty the can.

    a. Write an equation showing the relationship between the total fees charged, y, and the number of months, x, for Trash Gone garbage removal service.

    City Clean garbage removal service charges $30 for a garbage can and $18 a month to empty the can.

    b. Write an equation showing the relationship between the total fees charged, y, including the fee for the garbage can, and the number of months, x, for City Clean garbage removal service.

    c. After how many months will the total cost of Trash Gone be the same as the total cost of City Clean? Show or explain how you found your answer.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point, or minimal understanding by having correct expressions instead of equations in both parts a and b
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Scoring Notes

Part a: 1 point — for correct equation, $\boldsymbol{y = 20x}$

Part b: 1 point — for correct equation, $\boldsymbol{y = 18x + 30}$

Part c: 2 points — for correct answer, **15 (months)**, or correct answer based on parts a and b, with work shown or explanation given

OR

1 point — for correct answer without appropriate work shown or explanation given
or
for correct strategy with an incorrect or missing answer

Sample Response:

c. $20x = 18x + 30$

$2x = 30$

$x = 15$ months for both services to have the same total fee

Score Point 4

Sample 1

a) garbage can is free, and $20 dollars a month where x = 1 month
So there for $y = \$20x$

b) one garbage can costs 30$ then you have to pay $18 a month for removal, but not a garbage can. So 30 dollars is a flat rate there fore $y = \$18x + 30\$$

c) To find how many months it will take for the cost of Trash Gone equal the amount of City clean the cost per month ($20x) has to be equal to the cost per month of City Clean plus $30 for the trash can. So the equation is:

$20x = 18x + 30$

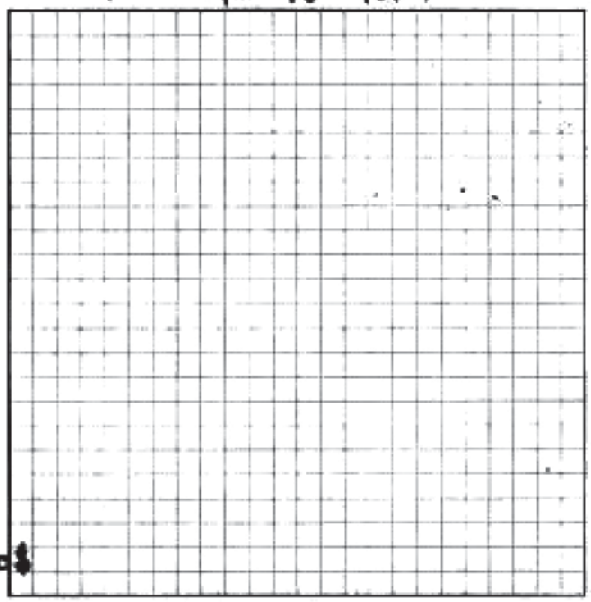
c) To find how many months it would take for each to equal the other you have to solve for x.

$20x = 18x + 30$
$-18x \quad -18x$

$2x = 30$

$x = 15$ months

This is true, because $18(15) + 30 = 300\$$ and $20(15) = 300\$$



Score Point 4

Sample 2

a) $y = 20x$

b) $y = 18x + 30$

c) Set the two equations equal to each other.

$20x = 18x + 30$

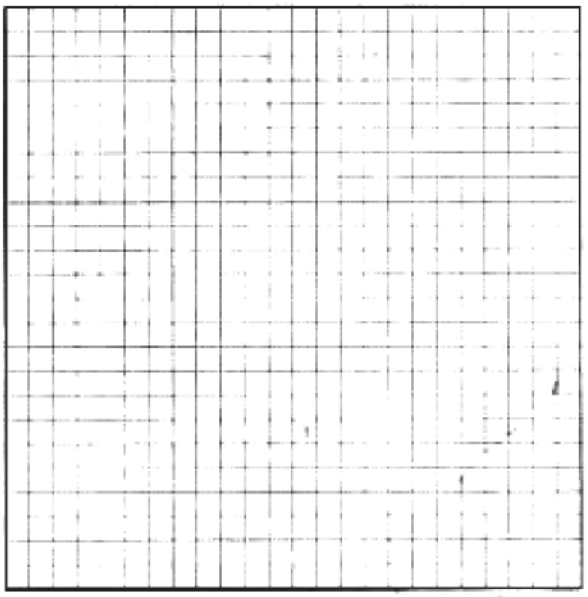
Subtract 18x from 20x

$2x = 30$

Divide to from 30

$x = 15$

So, after 15 months the total cost will be the same!



Score Point 3

Sample 1

$20 a month

a.) $20x = y$

b.) $30 + 18x = y$

c.) $(30 + 18x = y)\cdot 5$

$(20x = y)\cdot 4$

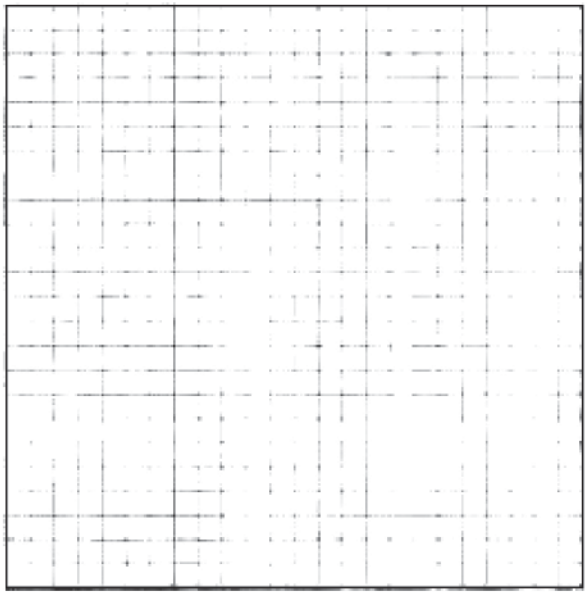
30 · 5 = 150

$-150 - 80x = -5y$

$80x = 4y$

$\frac{-150}{-1} = \frac{-1y}{-1}$

$y =$ 150 months



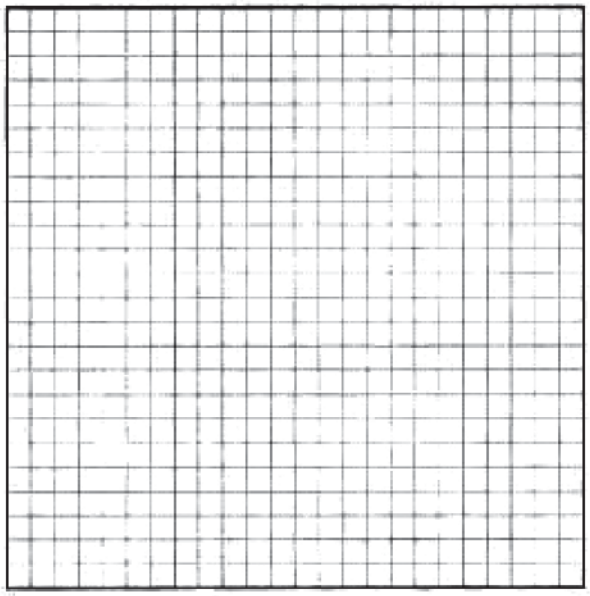
Score Point 3

Sample 2

a) $t = m \cdot 20$

b) $t = m \cdot 18 + 30$

c) 15, because Trashgone cost 2$ more a month and over 15 weeks that will even out with the 30$ cause $30/2 = 15$



Score Point 3

Sample 3

A) $20x = y$

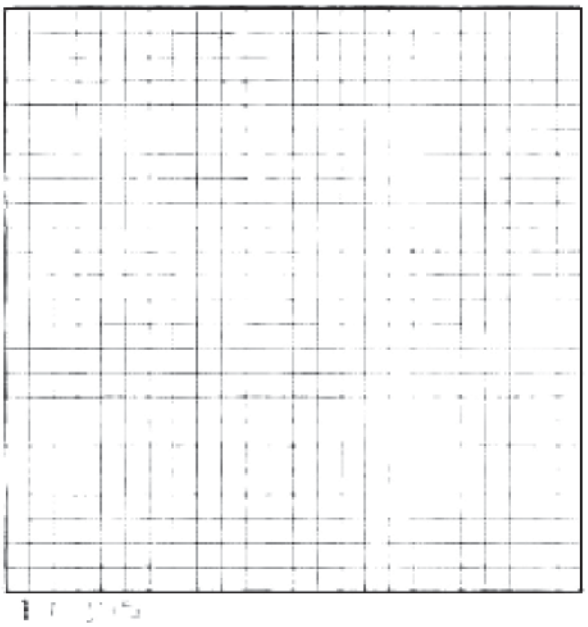
B) $18x + 30 = y$

$20x = y$

x	y
1	20
2	40
3	60
4	80
5	100
6	120
7	140
8	160
9	180
10	200
11	220

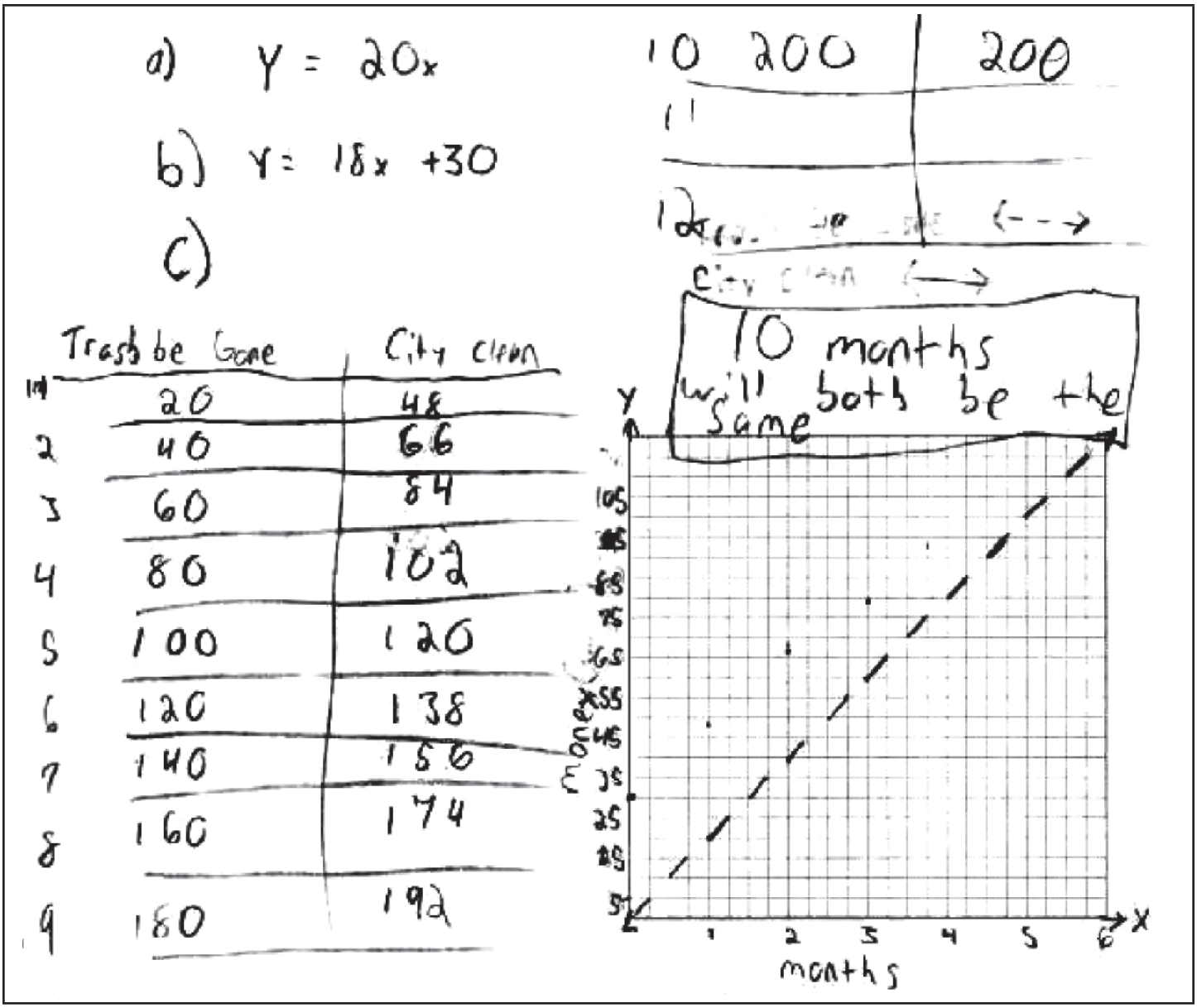
$18x + 30 = y$

x	y
1	48
2	66
3	84
4	102
5	120
6	
7	
8	
9	
10	



Score Point 3

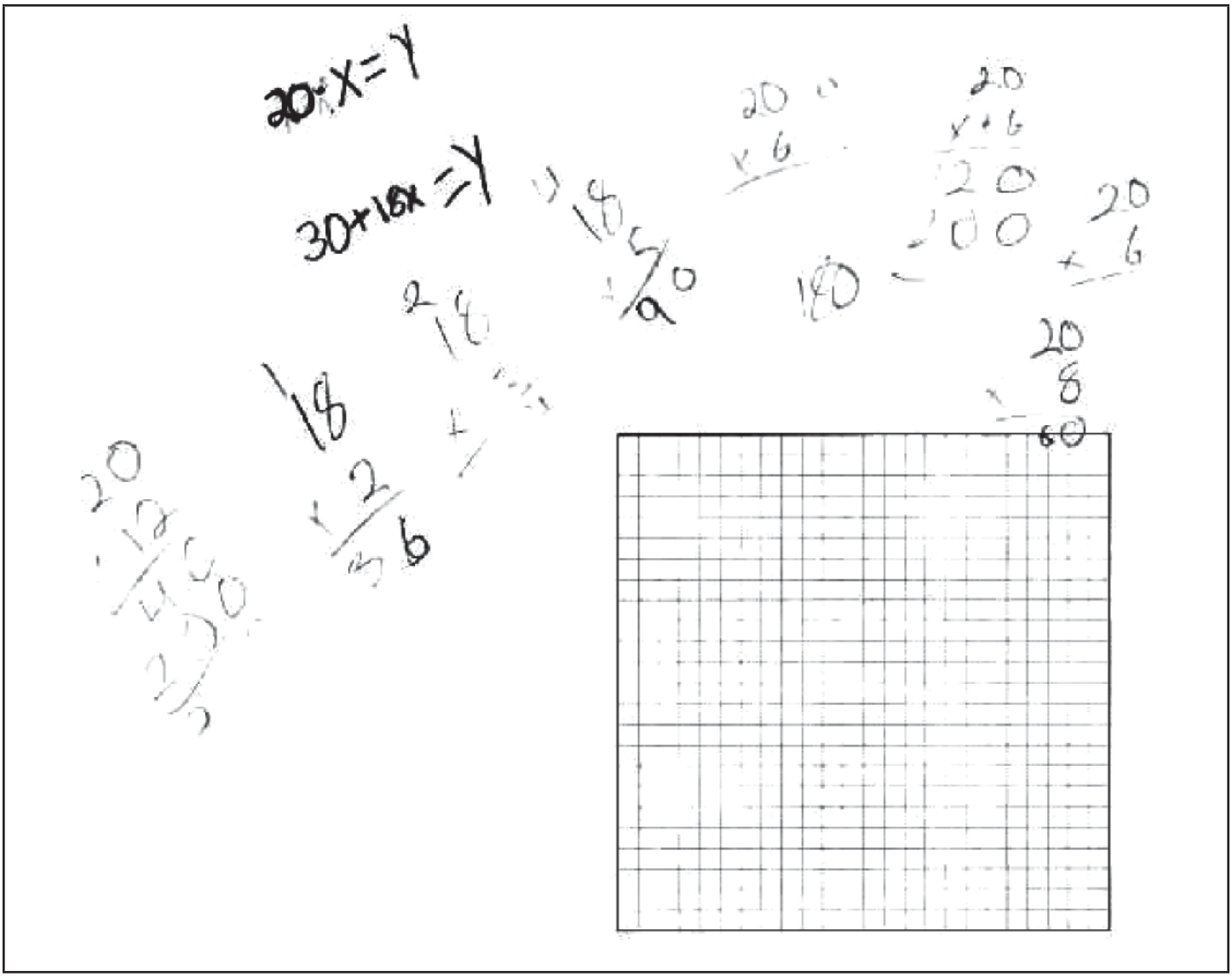
Sample 4



	Trash be Gone	City clean
1	20	48
2	40	66
3	60	84
4	80	102
5	100	120
6	120	138
7	140	156
8	160	174
9	180	192
10	200	200
11		
12		

Score Point 2

Sample 1



Score Point 2

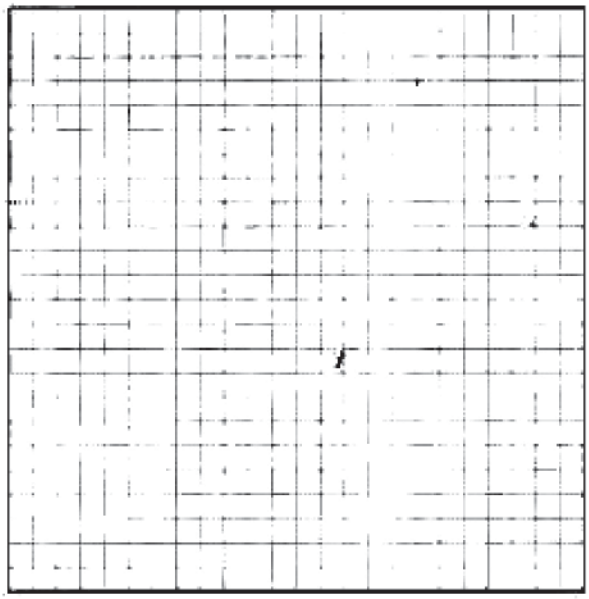
Sample 2

a. $y = x \cdot 20$

b. $y = x \cdot 18 - 30$

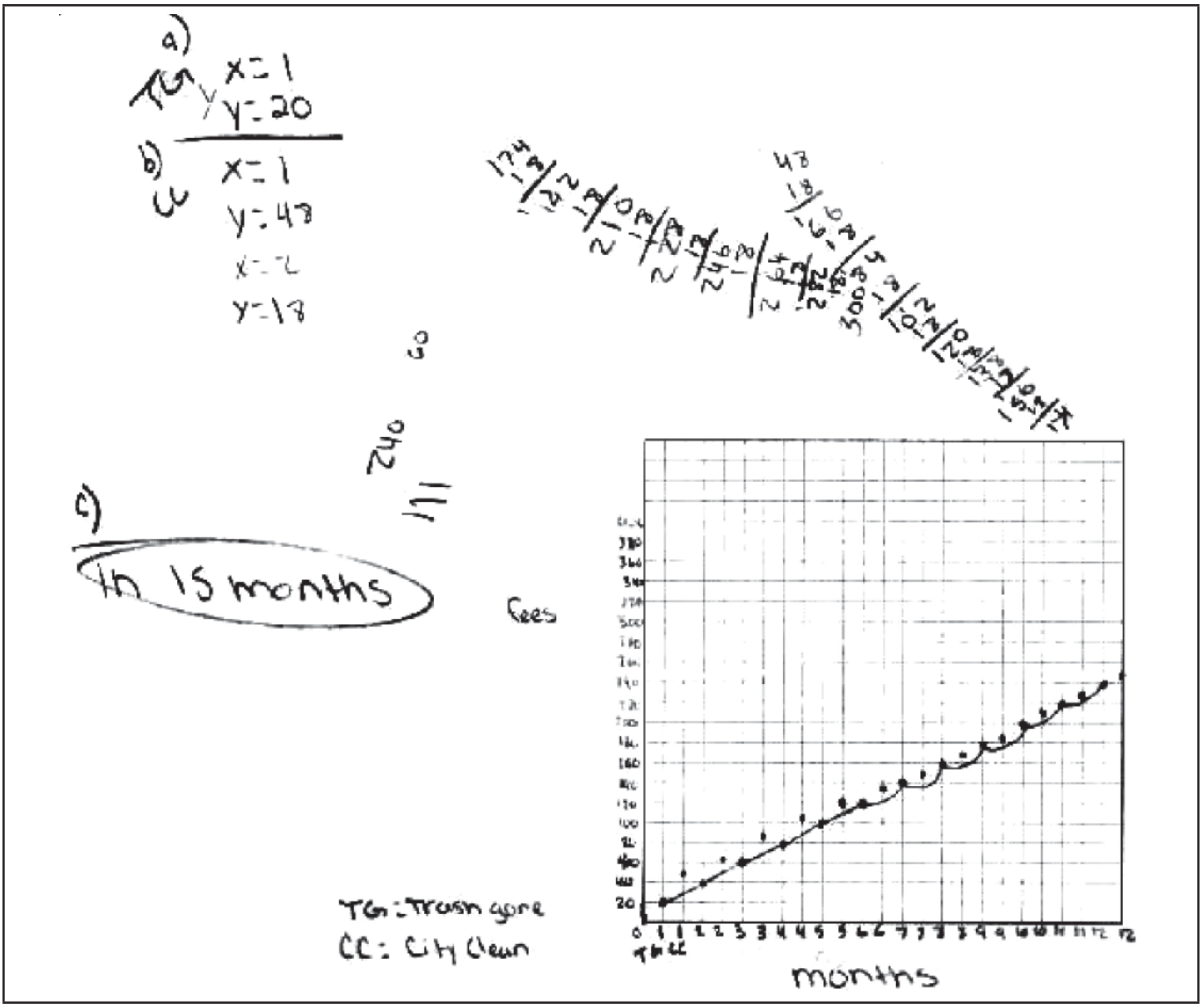
C = 15 months

found by deviding 30 by 2



Score Point 1

Sample 1



Score Point 1

Sample 2

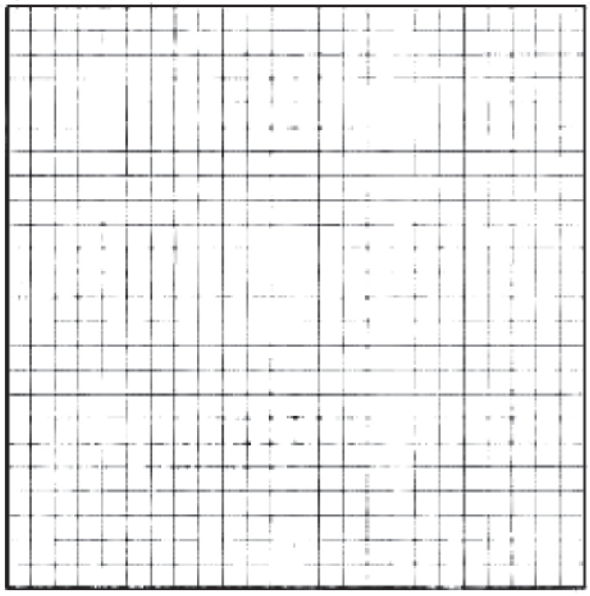
total fee charge: y
# of months: x

ⓐ $y = x + 20$

ⓑ $y = 18x + 30$

ⓒ 28 months

$18(1) + 30 = 48$
-20
28



Score Point 1

Sample 3

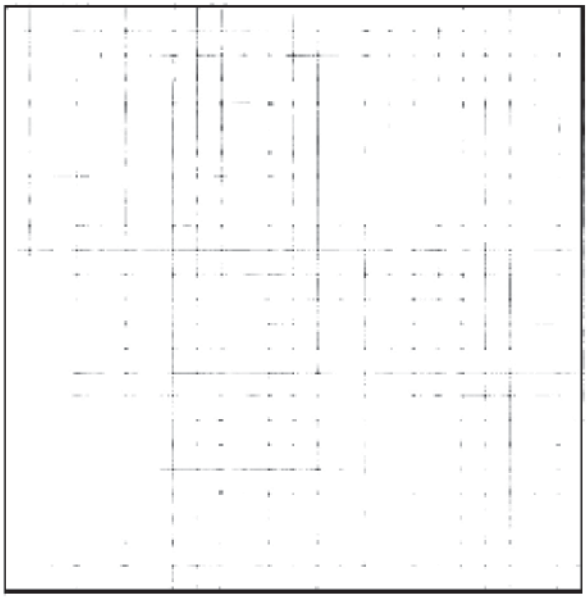
a. $20x$

b. $30 + 18x$

c.

$$\begin{array}{r} 30 \\ \times 18 \\ \hline 36 \\ 180 \\ \hline 216 \end{array} \qquad \begin{array}{r} 1 \\ 18 \\ \times 12 \\ \hline \end{array}$$

2



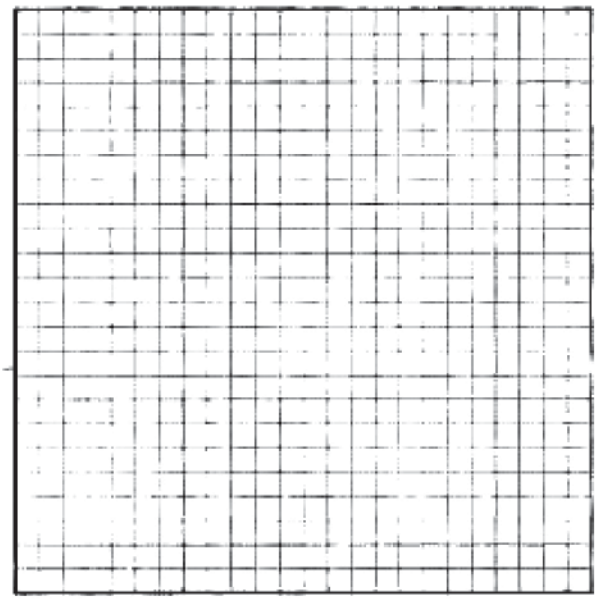
Score Point 0

Sample 1

A: 20+x=4

B: 48y+20x

C =



Score Point 0

Sample 2

a $x \cdot y = N$

b $30y + 18x = N$

c 46

46
46
46
+48
140
+48

20
20
30
20
+20
100
+20

I Don't Know